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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,004	03/24/2005	Yasuo Nishi	KOY-0047	8791

23413 7590 02/09/2007

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EXAMINER	
BOECKMANN, JASON J	
ART UNIT	PAPER NUMBER
3752	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/529,004	NISHI ET AL.	
	Examiner	Art Unit	
	Jason J. Boeckmann	3752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7 and 13* is/are pending in the application.

4a) Of the above claim(s) *8* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-7 and 13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *3/24/2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 1/22/07
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/22/2007 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Maria Rijn Van (WO 02/18058) using US 2003/018507 for reference.

Maria Rijn Van shows a liquid jetting device comprising a liquid jetting head (12) comprising a nozzle (13) to jet the droplet from an edge portion (10) an inside diameter of the edge portion being 2 microns with a portion of the edge portion being formed with an insulating material (Durimide 7510 paragraph 0092), a liquid solution supplying section (18) to supply the liquid solution to the nozzle and a jetting voltage applying section (paragraph 78, lines 1-5) to apply a jetting voltage to the liquid solution in the

nozzle, wherein the inside length of the nozzle is set to not less then 50 times the inside diameter of the nozzle at the nozzle edge portion (paragraph 56, the length of cavity 13 is 50 times the diameter of the nozzle 11).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 3-7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmerman (6,481,648) in view of Takahashi (6,412,925).

Zimmerman shows a liquid jetting apparatus comprising; a liquid jetting head (35) comprising a nozzle (31) to jet a droplet from an edge portion, a liquid solution supplying section (34, 42) and a jetting voltage applying section (64, 68) to apply a voltage to the liquid solution. The inside passage length of the nozzle is set to at least not less than

100 times the inside diameter (column 6, lines 10-2). Zimmerman does not specifically disclose that an inside diameter of the edge portion of the nozzle (31) being less than 4 micrometers and greater than .2 micrometers. However, Takahashi teaches that, "Recently, demands for higher printing resolutions have increased in order to improve print quality. To respond to such demands, it is preferable to reduce the ink droplet volume. The ink droplet volume is usually reduced by reducing the nozzle diameter or by reducing the drive voltage" (column 2, lines 44-49), making the nozzle diameter and the drive voltage results effective variables. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to reduce the size of the inside diameter of the edge portion of the nozzle of Zimmerman, to about 2 micrometers, since it has been held that discovering an optimum value of a results effective variable involves only routine skill in the art. (In re Boesch, 617 F.2d 272, 205 USPQ 215 CCPA 1980). This modification would increase the resolution of the fine spray that leaves the nozzle as taught by Takahashi.

Regarding claims 4 and 5, the wall thickness of the nozzle (31) at the edge portion is shown being no thicker than a length equal to the inside diameter of the nozzle (this is shown in figure 2b), especially if the nozzle diameter is now reduced to 8 or 4 micrometers. The thickness of the nozzle at an edge portion is set to not more than ¼ of the length of the inside diameter of the nozzle, depending on where you choose the edge portion.

Regarding claim 6, the liquid jetting apparatus is processed from polyether etherketone, which is inherently water resistant and an insulating material.

Regarding claim 7, the liquid jetting apparatus has an inclined surface with respect to the centerline of the inside passage (figure 2a).

Regarding claim 13, a jetting electrode (64, 68) is provided on a back end portion side of the nozzle (figure 5).

Claims 1, 3-7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmerman (6,481,648) in view of Maria Rijn Van (WO 02/18058) using US 2003/018507 for reference.

Zimmerman shows a liquid jetting apparatus comprising; a liquid jetting head (35) comprising a nozzle (31) to jet a droplet from an edge portion, a liquid solution supplying section (34, 42) and a jetting voltage applying section (64, 68) to apply a voltage to the liquid solution. The inside passage length of the nozzle is set to at least not less than 100 times the inside diameter (column 6, lines 10-2). Zimmerman does not specifically disclose that an inside diameter of the edge portion of the nozzle (31) being less than 4 micrometers and greater than .2 micrometers. However, Maria Rijn Van shows a liquid jetting device comprising a liquid jetting head (12) comprising a nozzle (13) to jet the droplet from an edge portion (10) an inside diameter of the edge portion being 2 micrometers. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to reduce the size of the inside diameter of the edge portion of the nozzle of Zimmerman, to about 2 micrometers, in order to atomize the fluid to be sprayed to produce small liquid droplets in air with a relative narrow droplet size, as taught by Maria Rijn Van (paragraph 0002).

Regarding claims 4 and 5, the wall thickness of the nozzle (31) at the edge portion is shown being no thicker than a length equal to the inside diameter of the nozzle (this is shown in figure 2b), especially if the nozzle diameter is now reduced to 8 or 4 micrometers. The thickness of the nozzle at an edge portion is set to not more than ¼ of the length of the inside diameter of the nozzle, depending on where you choose the edge portion.

Regarding claim 6, the liquid jetting apparatus is processed from polyether etherketone, which is inherently water resistant and an insulating material.

Regarding claim 7, the liquid jetting apparatus has an inclined surface with respect to the centerline of the inside passage (figure 2a).

Regarding claim 13, a jetting electrode (64, 68) is provided on a back end portion side of the nozzle (figure 5).

Response to Arguments

Applicant's arguments filed on 1/22/2007 have been fully considered but they are not persuasive. Even though Zimmerman does not specifically teach a nozzle diameter of between 0.2 and 4 microns, it does teach an inside nozzle diameter of less than 10 microns (because the outer diameter is 10 microns), Takahashi includes a specific teaching of decreasing the nozzle diameter to produce a certain effect. Therefore one of ordinary skill in the art would have been motivated to reduce the nozzle diameter of Zimmerman in order to achieve the desired effect as taught by Takahashi.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason J. Boeckmann whose telephone number is (571) 272-2708. The examiner can normally be reached on 7:30 - 5:00 m-f, first Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin P. Shaver can be reached on (571) 272-4720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JJB JJB 1/31/07

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